

2005-2006 Avocado Grower Seminars – Avocado Production in a New Era

California Avocado Society
California Avocado Commission
University of California Cooperative Extension

Summary prepared by Art Bliss

December, 2005

Vertebrate Pests

Presented by Dr. Terry Salmon, University of California

Pocket Gophers

- Named for “pockets” found in their cheeks
- Spend entire lifetime underground, searching for roots, and other foods
- Their teeth grow constantly, and are used to chew through soil, roots and other objects in their searches
- Generally solitary animals with one gopher per burrow, but will raid and use abandoned runs of other gophers
- Control measures
 - Trapping
 - Find active tunnel, insert trap (generally a Macabee type or box type)
 - Stake trap to prevent loss from other animals
 - No need to wear gloves to disguise human scent
 - Baits
 - Strychnine (a registered material)—use only in under ground runs; fast acting
 - Aluminum Phosphide (a registered material)—effective, fast acting, cost efficient, but don’t use near buildings
 - Anti-coagulants—not as effective; slower acting
 - Fumigation
 - Not very effective
 - Ultra-Sonic Devices
 - Generally do not work

Ground Squirrels

- Social animal which likes open, clean areas, good weather, dry climates
- Excellent climbers
- Lives underground in extensive burrows 2-3 feet below ground
- Searches areas outside tunnels for food
- In colder climates, they may hibernate during winter; heat in summer may cause reduction in activity; near coast they are active year-round
- Eating habits change with season
 - In spring tend to eat green grasses and leaves (means baiting not as effective)
 - In late spring thru fall, squirrel searches for seeds (means baiting is more effective)
- Control Measures
 - Fumigation (best in early spring)
 - Aluminum phosphide (a registered material) in burrows, then cover entrance
 - Baits (best in late spring through fall; test with Quaker Oats near burrow to see if they are eating seeds)
 - Zinc phosphide (a registered material) and anticoagulants
 - Keep bait fresh and away from potential “secondary” eaters (birds, etc.)
 - Trapping
 - Generally not very effective

Deer

- Problem is not as wide spread as other pests; depends on orchard location
- Fencing must be complete and tight, especially at bottom of fence line; expensive
- Scents and repellants do not work for long term control

Crop Estimating Program

Presented by Dr. Guy Witney, California Avocado Commission

- Began in 1986 to predict California crop size by region
- Goals were to aid industry and handlers in developing their harvest strategies
- Currently use numerous inputs (aerial survey, grower survey, acreage inventory, history)
- With advent of Geographic Information Systems (GIS), data will be improved by parcel, by variety, by age of planting, by condition of orchards
- Historical accuracy has been good (generally between 3%-5% of final production)
- 2004-05 predicted bigger volume than was harvested by 13%
- Reconfiguring estimate process to get better input and accuracy —higher visibility mailer to growers
 - web based calculator launched (<http://www.avocado.org/growers/CropEstimateCalc.php>)
 - weekly crop numbers reported along with “Crop Indicator”
 - “adjust as you harvest” feature to update growers estimate
 - more comprehensive calculator soon to launch on www.avocadosource.com

- Future of Estimating
 - Satellite Imagery
 - Online GIS maps for grower grove verification
 - Online crop estimate reporting
- Avocado Crop for 2005-06
 - Big domestic crop
 - Chile seems to be ending exports earlier than usual, meaning Calif will benefit
 - Mexican “flor loca” (off-bloom) crop reported low
 - Overall industry is more optimistic than before, and growers shouldn’t talk down price

February 2006

New Pest Invasions

Presented by Dr. Mark, Hoddle, UCR

- History
 - Recent new invasions have come from Mexico [brown mite (1982), Persea mite (1990), Scirtothrips (1996), *Neohydratothrips burungae* (2004) and avocado lacebug (2004)
 - All feed on leaves vs. fruit, indicating infestation initiated by plant material, i.e., budwood or plants smuggled into U.S.
- Avocado Lacebug (*Pseudacysta perseae*)
 - A true bug, first detected in San Diego in 2004, mainly in backyard trees
 - Damage is caused by sucking chlorophyll from underside of leaves
 - Leaves turn yellowish brown
 - Often have necrotic “islands” in leaves, possibly from secondary fungal infection
 - Leaves eventually fall off
 - “Black tar” on underside of leaves often associated with egg masses
 - May prefer Bacon variety to Hass
 - Lifecycle is 22 days from egg to adult
 - Prefers hot weather
 - Eradication
 - Isolated to San Diego County, but infestation too large to eradicate, so are trying to contain it within geographic area
 - Trying to discover natural predators
 - No chemical controls available for commercial orchards, but several materials for backyard trees
 - Further information on California Avocado Commission website; AvoResearch flyer available
- *Neohydratothrips burungae*
 - Discovered in San Diego in 2004 but none collected north of San Diego or

Riverside Counties

- Likes warm, humid climates (vs. scirtothrips which likes cool, coastal climates)
- May not become firmly established in California because of lack of humidity
- Appearance is very similar to scirtothrips, but has bigger mouthparts which may cause more scarring to larger fruit

Pesticide Resistance in Avocados

Presented by Dr. Eduardo Humeres, UCR

- Pesticide Resistance evolves over time as the most susceptible part of the population is killed, leaving stronger specimens within the population
- Resistance depends on the number within the population that escapes eradication during spraying
- Two recent, documented cases of resistance in Ventura County
 - Persea mites using Agrimek
 - Thrips using Success
- Continually screening for new products but it is a long, slow process
 - Agnemek is remarkably effective against thrips, and considered soft on beneficials
 - Try to limit the number of sprayings
 - Currently few alternatives available

Evaluating Systemic Insecticides for Thrips & Lacebug

Presented by Dr. Frank Burns, UCR

- Trying to evaluate uptake of systemic insecticide thru roots—applied via irrigation
- Studying mechanics of this method using Neonicotinoids (Admire)
 - Began in nursery study
 - First field study in 2005
 - Uptake and success seems affected by type of soil (clays which bind material to soil particles vs. sandy soils which leach out)
 - Compare insecticide level in newer leaves (for thrips) vs. mature leaves (for persea and lacebug)
 - New leaves begin to show material within two weeks - Apparently takes longer to get into mature leaves— up to 18 weeks—but gives good control of lacebug - Better uptake in small trees vs. large trees—may be because biomass of larger trees dilutes material
 - Takes time to build up high enough dosage to kill pest - Need to check for residues in fruit and leaves and potential resistance in pests
 - Long term project which is just getting started
 - Still several years away but seems to have potential for containing lacebugs; thrips may be more difficult

April 2006

Food Safety and Best Agricultural Practices

Presented by Dr. Guy Witney, CAC

- CAC has developed the following materials dealing with food safety
 - Best Agricultural Practices available to growers on DVD or in printed manual
 - Good Handling Practices for handlers
 - Merchandising Guidelines for retail industry
- Other commodities have developed Good Agricultural Practices because of previous food illness outbreaks (strawberry industry)
- Other countries have already developed guidelines
 - EUREGAP, CHILEGAP, TESCO
- CAC is trying to set its own “agenda” vs. being legislated by government
 - Avocado industry has some gaps in their food security system - Fertilizers—runoff and discharge
 - Social sensitivity—labor and worker conditions
- Retailer has been driving force in this issue
 - Retailer can choose source of product
 - Wants trace back capability
 - Concerned with picking and post-harvest conditions
 - Picking temperatures
 - Shaded with correct materials (not leaves and branches)
 - No contact with ground
 - Sanitary facilities for pickers

AvoHQ

Presented by Jose Luis Obregon, Hass Avocado Board

- First global internet system dealing with produce shipments
 - Links multiple countries on 24/7 basis
 - Tries to co-ordinate orderly flow of fruit to U.S. market
- Volume Section
 - Projects arrivals
 - Packed inventory
 - Scheduled promotions for the year
 - Daily & Weekly market summary
- Markets Section
 - Data on over 60 markets showing volume, prices and sizes
 - Retail data
 - Marketing programs from all sources
- Weather alerts
- Market/Media Section

June 2006

Optimizing Fertilization

Presented by Dr. Carol Lovatt, Department of Botany and Plant Sciences, UCR

- A presentation featuring results from the collaborative research of Dr. Richard Rosecrance, Department of Biology, California State University, Chico; Dr. Ben Faber, UC Cooperative Extension Farm Advisor, Ventura and Santa Barbara Counties; and Dr. Lovatt.
- Historically, only a few elements required for avocado plant growth have been studied (N, Fe, & Zn) to determine the optimal rates for soil-applied fertilizers. Recommendations for avocados for most nutrients are based on leaf analyses using optimum ranges established for citrus.

Nitrogen Studies

- Lovatt (2001, JASHS 126:555-559) conducted a 4-year nitrogen fertilization study. The results provided evidence that a double dose of N (50 lbs/a) applied in April or November (25 lbs N/acre/ year than the control) increased 1) the yield per tree and 2) the overall size of the fruit compared to the standard application of applying 125 lbs of actual N per acre annually in equal monthly increments in January, February, April, June and November.
 - Applying double doses of N raised concerns of increased potential for N pollution of ground water tables.
 - Uptake of many nutrients is influenced by the tree's fruit load. "On" year requirements are greater than "off" year requirements, and fruit load is the driving force for taking up nutrients.
- Salvo and Lovatt (in review) conducted a second 4-year study in which a set of trees received 25 lbs N per acre each at a key stage of tree phenology in April, July, August, November, and January (control). Separate sets of trees received double doses of N in April, November, August and in both April and November, or a triple dose of soil- or foliar-applied N in April, with trees in these treatments receiving proportionally reduced amounts of N in each of the remaining months that the control was fertilized so that all trees in the experiment received 125 lbs N per acre annually. The single exception was a set of trees that received only 40 lbs N per acre each year split in July and August.
 - July-August application is important because it's the period of exponential increase in fruit size and June drop for the current crop, the beginning of the drop period for mature fruit and the time when trees transition from vegetative growth to reproductive growth.
 - Application dates may vary slightly, depending on tree's actual phenology.
 - To mitigate alternate bearing

- Double dose N in April
- Try to increase summer vegetative growth (shoot growth) w/ July application
- No ill effects from applying N during bloom period if you use ~40-50 lbs N/acre; yields are not significantly reduced by 75 lbs N/acre, but there is no need to use more than 40-50 lbs N/acre in a single application or in two applications within a 30-40 day period.
- No relationship between Nitrogen in leaf analysis and the tree's yield.

Study on Nutrient Uptake and Partitioning as a Function of Crop Load of the 'Hass' Avocado

- The study identified which nutrients are taken up by the tree, when they are taken up, how much is taken up, and whether the nutrient is used for reproductive and/or vegetative growth.
- Methodology and analysis consisted of excavating and dissecting 1 tree in "on" year production, and 1 tree in "off" year production, monthly for two years. Each tree was divided into 12 components and the concentration of 12 essential nutrients was determined for each tissue.
- Preliminary findings include:
 - Nitrogen
 - The fruit is the major "sink" for nitrogen, and more fruit pulls more nitrogen to leaves and roots, but less into the tree's storage tissues, green twigs, canopy branches and trunk.
 - There is a significant uptake of N into the mature fruit from April to July, at the same time developing fruit are beginning a period of N uptake.
 - Potassium
 - "On" crop has much more potassium in the fruit and "off" crop has much more potassium in the leaves. - At the end of the growing year, there is less K in roots and trunk, suggesting that K may be a limiting factor.
 - There is dramatic uptake in K from April thru July by mature fruit at the same time young fruit are beginning a period of K uptake. The amount of K taken up is nearly twice the amount of N.
 - Calcium
 - Big uptake in July because of young fruit's demand, mature fruit did not take up very much Ca .
 - Important to supply this in early stages of fruit development.
 - Magnesium
 - Uptake similar to Potassium, but the total taken up is much lower.

Working with a Laboratory

Presented by Darrell Nelson, Fruit Growers Laboratory, Santa Paula, CA

- New computer programs now available to make analyses user friendly, and FGL

has reworked their report format to take advantage of this

- Four Major Considerations in Fertilizer Program
 - Soil Analysis - Cation Exchange Capacity
 - Soil Texture/Saturation level
 - pH of soil
 - Soil temperature greater than 50 degrees required for efficient nutrient uptake
 - Leaf Analysis
 - Historically taken September thru October
 - FGL has data monitoring orchards that are consistently high producers
 - Initiating mid year program in May to ensure nutrition is on track for current year vs. waiting until Sept. when nutrients may be in short supply
 - Findings
 1. Nitrogen, potassium and zinc decline as year progresses
 2. Calcium increases as year progresses
 - Water Analysis
 - Check analysis at least every other year
 - Alkalinity (high pH) leads to plugging of emitters; mitigated with sulfuric acid
 - Nutrients used by crop previously harvested
 - Need to replace these nutrients plus extra buffer • Other

Considerations

- Air temperature for foliar application should be less than 87 degrees
- Even then, avocados do not take up foliar applications efficiently
- More applications in smaller doses increase uptake efficiency

August 2006

Field Trip to South Coast Field Station to view rootstock and scion trials

Field Trip to offices of California Avocado Commission to view new offices, including HAB facilities and video capabilities for world-wide interaction with foreign shippers.

These notes for the 2005-2006 Avocado Grower Seminars were provided by the President of the California Avocado Society, Arthur Bliss